



START

9517338.2607  
Department of Energy

Richland Operations Office  
P.O. Box 550  
Richland, Washington 99352

014010

0041025

APR 14 1995

Mr. Douglas R. Sherwood  
Hanford Project Manager  
U.S. Environmental Protection Agency  
712 Swift Boulevard, Suite 5  
Richland, Washington 99352-0539

Dear Mr. Sherwood:

RESPONSE TO THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) COMMENTS OF  
FEBRUARY 28, 1995, ON "IDENTIFICATION OF CONTAMINANTS OF CONCERN," PNL-10400, 40158  
UC-630, DRAFT, JANUARY 1995

Attached are the U.S. Department of Energy, Richland Operations Office,  
responses to the subject comments. If you want to discuss these comments,  
please contact Mr. Randy Brich at (509) 376-9031.

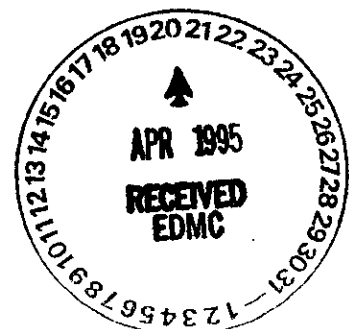
Sincerely,

  
Julie K. Erickson, Director  
River Sites Restoration Division

RSD:RFB

Attachment

cc w/attach:  
S. Alexander, Ecology  
J. Erickson, DOH  
P. Eslinger, PNL  
L. Gadbois, EPA  
D. Holland, Ecology  
R. Jim, YIN  
B. Napier, PNL  
D. Powaukee, NPT  
J. Wilkinson, CTUIR  
J. Yokel, Ecology



RESPONSE TO THE U.S. ENVIRONMENTAL PROTECTION AGENCY COMMENTS OF  
FEBRUARY 28, 1995, ON "IDENTIFICATION OF CONTAMINANTS OF CONCERN,"  
PNL-10400, UC-630, DRAFT, JANUARY 1995

Responses to each of the following comments are provided below:

1. Page vii, Scope of Work, 1st paragraph:  
The document indicates that the spacial focus is on the Hanford 100, 300, and 1100 Areas. This violates the direction we have provided to this project during years before its inception, and throughout the life of the project thus far. In scoping meetings, DOE and PNL were in full agreement with us that the initial screening assessments of the river would encompass the entire downstream portion, and thereafter more detailed assessments would focus on potential areas of impact identified during the initial assessments. Apparently DOE and PNL have unilaterally decided to cut the project scope down to certain portions of the Hanford Reach. That is in sharp contrast to:
  - \* Earlier commitments to initially address the entire downstream portion of the river.
  - \* EPA and Ecology comments throughout scoping for this project and during comments on an earlier document "Columbia River Impact Evaluation Plan".
  - \* Widespread stakeholder direction to address downstream portions of the river.
  - \* Documents such as PNL-8167 UC-703 (November 1992) that addressed contaminant discharge to the Columbia River near the Hanford townsite (downstream of the 100 Area). This area discharges contaminants from the 200 Area, has the highest concentrations of some contaminants entering the river anywhere at Hanford, yet is not encompassed by the document's "spacial focus on [the] Hanford 100, 300 and 1100 Areas".

**Response:** Not Accepted. The Draft Contaminants of Concern report utilized the maximum value of any contaminant measured since 1980 either in the river or near the river as an input parameter to a conservative screening calculation. Thus, the approach was not limited to any specific operable unit. We will modify the wording to make the wider focus obvious.

2. Page viii, Initial Screening:  
The document states that "Initial screening eliminated the contaminants on the list that showed no detectable levels of activity or concentration". A concern with this approach is that contaminants that have a routine detection limit that is not very sensitive, yet is very toxic/carcinogenic could be dismissed during the initial screening when in fact it is at concentrations that have adverse effects.

**Response:** Not Accepted. The detection limits typically used in data collection at Hanford over the last 15 years meet or exceed those established by EPA. Per Tri-Party Agreement (TPA) Change Number M-13-93-06 dated January 25, 1994, titled, "Cleanup Strategy Documents for the Columbia River and Hanford Groundwater," the existing data will be used in the initial screening.

3. Page viii, Radionuclide Screening:  
EPA has recently revised slope factors for radionuclides compiled in HEAST format. Please see: "Health Effects Assessment Summary Tables: FY-1994 Supplement No. 2", EPA/540/R-94/059 PB94-921102, November 1994. The latest guidance on slope factors should be used.

**Response:** Accepted. Realizing that EPA updates the slope factors annually, the slope factors in the November 1994 publication will be used.

4. Page viii, Ambient Water Quality Criteria Screening  
This document has defined EPA's criteria to be "safe and protective of aquatic life". In fact, criteria are built up from several components. For example, they have a toxicological basis that seeks to be protective of most organisms under most conditions. Thus they are not an all-encompassing "safe and protective of aquatic life" as stated in the document. Another component to the criteria is analytical detection limits. Criteria are based on measurable concentrations. If contaminants are toxic at below-detection-limit, criteria may not be protective. An additional component to criteria is the result of corporate/political lobbying. Petroleum provides a well-known example. The ambient water quality criteria is based on the saturation limit and the subsequent characteristic iridescent sheen on the water surface at higher concentrations. Toxicity data does not support conclusions that water saturated with petroleum but is not super-saturated so as to produce a sheen (and thus is within ambient water quality criteria) is "safe and protective of aquatic life".

**Response:** Acknowledged. An appropriate quote from the specific citation will be used to describe this criteria.

5. Page viii, Nonhazardous Screening  
The document states: "The screening process identified several materials as nonhazardous under environmental conditions (EPA 1991; EPA 1989). These contaminants eliminated from further considerations are aluminum, calcium, iron, magnesium, potassium, and sodium".

Statements such as this is troubling for several reasons. Both those EPA guidance documents address human health. The screening in this PNL document is for contaminant assessment for both human health and the environment. In this document, EPA guidance has been misused. That is troubling because it raises concern regarding how appropriately other guidance has been used in this document. The second troubling aspect is that in draft revisions to the Hanford Site Baseline Risk Assessment Methodology (HSBRAM), DOE had done this same thing: used human health guidance (EPA 1991) to screen contaminants for ecological evaluation. We have discussed this error with DOE and HSBRAM was appropriately changed. Now the current PNL document repeats that error. It is troubling that the collective knowledge gained in putting together the HSBRAM is not being utilized in the river assessment (see also later comments on the risk screening models of section 4.1).

**Response:** Accepted in part. These six contaminants will be used in the ecological screens.

## 6. Page ix, first line

The document states that "All of the screenings require an estimate of the contaminant's concentration in river water". This implies that contaminant effects are calculated post-dilution into the full river flow. This is not what happens. Contaminants entering the river near the southern and western shore clings that shoreline for many 10s of miles downstream. Transects across the river at the Richland pumphouse (downstream of all of Hanford) shows a marked difference in concentrations between the east and west sides of the river. Thus groundwater plumes are not instantly diluted into the entire river flow prior to exposure to receptors. Secondly, receptors that live within the bottom substrate are exposed to groundwater that probably has some dilution with river water, but obviously not full river dilution.

These are not novel ideas. These have been discussed in many forums for years, yet the document authors apparently dismissed these concerns in the decision to assess effects post-full-dilution. This is especially inappropriate in an initial screening of data to identify contaminants of concern.

**Response:** Accepted. Screens will be developed to address concentrations in seeps and riparian zones before complete mixing in the river.

## 7. Page viii - ix, Screening criteria

None of the criteria indicate any effort towards looking at interactive effects of contaminants or potentiation effects. In earlier scoping discussions on this project, we agreed that this was an important aspect of the assessment.

**Response:** Not Accepted. The limits on the conservative screens are set very low for each contaminant. If interactions do occur, they are not expected to increase the risk by even an order of magnitude; thus, the eliminated contaminants are not expected to contribute significantly to risk.

## 8. Page xiii, bioconcentration factor

The definition provided is the "ratio between the radionuclide concentration in biota and the radionuclide concentration in the water in which the biota live and feed". This appears to be a project-specific definition rather than the standard definition of this term. Even so, contamination in riparian vegetation rooted in the banks of the Columbia River can be described as a function of a bioconcentration factor from the soil within its root zone.

**Response:** Accepted in part. Two separate items are discussed in this statement. For plant-to-soil, the concentration ration (bio concentration factor) is defined as the ratio between the radionuclide activity per unit mass of plant to the radionuclide activity per unit mass of soil. For aquatic organisms, the term concentration factor is defined as the ratio of the equilibrium concentration in the organism to the concentration in water. (Source: Till, J. E. and Meyer, H. R. "Radiological Assessment a Textbook on Environmental Dose Analysis" NUREG/CR-3332, ORNL-5968, September 1983, U.S. Government Printing Office, Washington, D.C., 20402.)

9. Page xiii, CERCLA  
CERCLA is being used as amended, not as per the original statute. This same idea applies to the other regulations as well.

**Response: Accepted.**

10. Page xiii, conceptual model  
Conceptual models include ecological models (which included abiotic factors). This idea is not contained in the limited definition provided in the document.

**Response: Not Accepted. Ecological model fits within the definition provided.**

11. Page xv, production reactor  
These reactor areas should be identified as "100-B", "100-C" etc. rather than "B", "C" etc. This helps prevent confusion with the 200 Area alphabet mix. Also this change will then match the usage in the text (see for example the first bullet on page 1.1).

**Response: Accepted. Appropriate designators will be used.**

12. Page 1.3, 3rd-4th line  
Regarding the Hanford Reach, the document states that "This stretch of the river offers a unique example of the river and riparian (riverside) ecologies that characterized the Columbia Basin ecosystem prior to construction of hydroelectric dams on the river." The uniqueness and importance of this portion of the river relative to upstream and downstream portions is notable, however it is significantly altered from the pre-dam era. The tremendous spring freshet that scoured the river bottom and shore kept the riparian zone essentially vegetation-free. That is not the case today. Also without the annual pulse, the river bottom is less dynamic.

**Response: Acknowledged. No revision required.**

13. Page 1.3, 2nd paragraph, last sentence  
The document states that "Contamination reaches the river through groundwater seepage". It should also be pointed out that oscillations due to river elevation changes enhances flushing to the river.

**Response: Acknowledged. No revision required.**

14. Page 2.7, Section 2.5, Limited Field Investigations  
It should be pointed out the Limited Field Investigation is an abbreviated version of a Remedial Investigation (section 2.3).

**Response: Accepted.**

15. Page 2.8, 1st paragraph  
Five operable unit documents are indicated as not available to the public. All the documents indicated have been approved by DOE for public release. They are available to the public through the administrative record.

**Response: Accepted.**

16. Page 4.1, Section 4.0, 2nd paragraph  
An incidental sediment ingestion rate of 10 mg/day was used. The basis for this is claimed to be the HSRAM [HSBRAM]. The HSBRAM prescribes the use of 200 mg/day soil ingestion rate, which would be the appropriate intake rate for riparian areas. The contaminant of concern screening methodology was applied to riparian areas. Thus 200 mg/day should be used, not 10 mg/day. Use of the HSBRAM methodology for risk assessments has already been agreed to by DOE and the regulators. The decision represented in this document should not have happened.

**Response:** Not Accepted. The scenario analyzed is not the one referenced from the HSBRAM. In general, the HSBRAM methodology is not appropriate for this assessment.

17. Page 4.1, 3rd paragraph  
The document indicates that ecosystem risk was based on water quality criteria and "a fraction of the concentrations that result in mortality for fish". In contrast, on page viii for aquatic biota toxicity screening, it indicates that for a few analytes "test results for crayfish or insects were used". Whichever one of these statements is in error should be corrected.

**Response:** Not Accepted. One statement refers to a conceptual model and the other refers to limited data availability, requiring surrogate values.

18. Page 4.1, last line  
The document states that the relationship between the concentration in the water and the concentration in the sediment "is assumed to be described by a ratio of 1:100,000". This assumption is stated to be based on a review of river water and sediment data yet that analysis is not provided. It is also referenced to the GENII computer code, yet for all reader knows, the computer code may not have had any basis in fact - merely a hypothesized ratio in the absence of data.

In addition, it is not known if this ratio is intentionally conservative or non-conservative with respect to the sediment as a source for contaminating overlying water. If it is conservative for the sediment-to-water desorption, it would be non-conservative for water-to-sediment sorption (the case of sediment becoming contaminated due to contaminants from the water).

Of course, the biggest concern with the one-number-fits-all approach is that contaminants don't behave that way. Sorption and desorption kinetics are both contaminant specific and sediment-type specific, resulting in many orders of magnitude variability. For a document that should be looking at each contaminant individually for its potential as a risk driver, such as gross measure is not appropriate. Examination of sorption and desorption (leaching) parameters is routine at Hanford so contaminant-specific data is readily available. The use of the 1:100,000 ratio for everything is too simplistic when actual data is readily available.

**Response:** Not Accepted. This is a simplistic approach to be used when data are not available in both media. Sorption data are not available for most of the several hundred contaminants identified. The value is conservative for water to sediment transfers. Routine surveillance has analyzed ambient river water for the EPA priority pollutant list. Those

contaminants not detected are given surrogate values in this screen. While it may not be conservative for sediment to water transfers, available data on measured water concentrations imply that the option values are quite high.

19. Page 4.2 - 4.3, Sections 4.1.1 through 4.1.3  
Three equations are provided for calculating screening levels, however the basis for those equations is not provided. These equations are key decision steps to determining which contaminants are included in the assessment. These key decision steps appear to have been pulled out of the air. Within the HSB RAM, the Tri-Parties have agreed on the method to calculate screening levels. That HSB RAM approved method bears no resemblance to the method used in this document. There are other concerns with the approach, such as the exposure duration. What is it? Is it 30 years or 1 day? A dose spread over a year which is deemed safe is likely not a safe dose if received in one day. The inverse also needs to be evaluated (i.e. a safe acute one-day dose is generally not a safe dose if received on a chronic basis).

**Response:** Accepted in part. The equations are based on the conceptual exposure scenarios described earlier in the document. The equations are based on annual average concentrations and the EPA factor assumptions of 30-year exposure. The description of the screens will be modified.

**Not Accepted in part.** In general, the HSB RAM methodology is not appropriate for this assessment.

20. Page 4.3, Section 4.1.4  
The document's cart blanc statement that water quality criteria are protective of aquatic life has been addressed already. In addition, this approach does not address synergistic or even additive effects.

**Response:** Acknowledged. See responses to comments 4 and 7, respectively.

21. Page 4.4, equation (5)  
The term "TLM" should be defined (as was done for LD<sub>50</sub>).

**Response:** Accepted.

22. Page 4.4, section 4.1.5, last paragraph  
The document appropriately identifies concern with groundwater filtering up through salmon spawning gravel beds. That is good. But the document then goes on to state that very few connections between fish egg survival and contaminant concentrations were found. It is the post-hatch stages that appear to be the most sensitive early stage, not the egg stage. Thus, the document authors may have been looking for the wrong type of information. The early life stages of salmon and trout have long been recognized as sensitive indicators of contaminants, and is a common bioassay. Thus it is puzzling that the document states that few positive connections between fish egg survival and contaminant concentration were found.

Of larger importance is that even after identification of the concern regarding fish egg exposure to groundwater prior to dilution with river water, complete dilution into the entire flow of the Columbia

River is assumed prior to identification of contaminant concentration thresholds of concern. That is not appropriate.

**Response:** Accepted. We will look again for appropriate data and incorporate it into the proper screen. Any citations would be appreciated.

23. Page 4.5, first few lines

The document provides several citations for using "an estimated discharge [of groundwater] of 100 cfs over the entire Hanford Reach". There is no indication if this is an annual average or a seasonal average, or a daily peak during a peak season, or... This is important to identify which assumptions and parameters are upper or lower bounds, or average values.

**Response:** Accepted. Annual average used because screening equations use annual averages.

24. Page 4.5, equation (6)

This equation assumes instant total dilution into the entire flow of the Columbia River prior to exposure to any receptor. That is not appropriate (see earlier comments on this topic).

**Response:** Accepted. See response to comment 6.

25. Page 4.5, equation (6)

An annual average river flow of 100,000 cfs is used. Minimal river flow is about one third that amount. Hence only one third the dilution potential. Also when the river is low (following a period of high river level) groundwater discharge is maximal. Thus maximal contaminant loading occurs at the time of minimal dilution. PLUS, this generally occurs at the time then Fall Chinook Salmon are spawning, an important species depositing its sensitive live stage in a maximally exposed (minimal dilution) micro-habitat. The document's approaches such as using annual river flows and post-dilution exposure screening fails to address concerns such as salmon spawning in the Hanford Reach.

**Response:** Accepted. See responses to comments 6 and 24. Note: The change would make a difference of a factor of 3 in the risk in all existing screens.

26. Page 4.5, last line

The document states that contaminants in sediment are assumed to be tightly bound. Presumably this results from the 1:100,000 water to sediment contaminant ratio. Some contaminants are not that tightly bound to sediments and thus have a higher source potential to the water column. Secondly, deposit feeders such as benthic infauna pass the assumed tightly bound contaminants through their acidic corrosive digestive systems and can extract contaminants not otherwise available via dissolution to the ambient water. Thirdly, the 1:100,000 ratio was stated as having some empirical basis in field data (though the data or references were not provided). Some organisms live in the sediment and have significant exposed to pore water rather than the dilute river water.

**Response:** Accepted in part. See response to comment 18. We will add another screen as noted in the response to comment 6.



27. Page 4.6, first 2 lines  
The document states that the surrogate groundwater contamination is assumed to have the same concentration of contaminants as the soil. For most contaminants, that is grossly conservative, especially in this climate and soil type. The risk assessment parameters used in this document must be a best estimate of reality, with a mixture of conservative and central-tendency parameters. For a screening purposes, a higher proportion of conservative parameters is appropriate. Still, the parameters should be realistic. As an example <sup>137</sup>Cs, a Hanford contaminant in soils near the Columbia River, is essentially non-mobile in the vadose soil. It will not contaminant the groundwater.

**Response: Not Accepted. Conservatism will be retained in this screening report. We expect to use realistic values in the final assessment.**

28. Page 4.7, Section 4.3, 2nd paragraph  
Background levels for radionuclides and chemicals are discussed here and other places in the document, yet the parameters are not provided nor a reference given. One recommendation would be for the text to reference appendix B, and then add a column for background to that table.

**Response: Not Accepted. Values and references are given in Tables A.1 and A.2.**

29. Page 4.7, Section 4.3.1, 1st sentence  
The document states that "of the thousands of available environmental samples, relatively few show positive identification of contaminants directly in the waters of the Columbia River". This begs but does not answer the question: if the detection limits used for those thousands of samples were sufficiently sensitive to have detected low-level concentrations that cause chronic effects. If appropriate sensitivity can be demonstrated, then the statement is acceptable. If not it should be removed.

**Response: Not Accepted. See response to comment 2.**

30. Page 4.7, Section 4.3.1  
The statement that "A screening level was used to account for over 1) 95 percent of the carcinogenic risk for each result, above a cutoff of  $10^{-6}$ " is unclear. Please explain.

**Response: Accepted. Description will be revised.**

31. Page 4.8, Section 4.3.2  
It appears that the statement "Contaminants identified for investigation include several metals" should be stated as "Contaminants identified for investigation include several metals and radionuclides".

**Response: Accepted. Description will be revised as suggested.**

32. Page 4.9, top few lines  
The document states that "Like the river water screening, this process identified two isotopes of cesium, both of which are likely associated with global fallout". If this statement is true, then these contaminants should have been removed from consideration during the

background screen? If they are not part of background, then the statement in the document should be removed.

**Response:** Accepted in part. Background values were not available for all contaminants in all media. In our professional opinion, the values are from background, but based on the screening approach chosen, it cannot be eliminated at this time.

33. Page 4.9, Section 4.3.4, first sentence

The document states "Contaminants measured in soil near the Columbia River are generally not an immediate hazard because they are currently in the soil and not subject to mass transport to the river, and subsequent human and biotic exposure". A slight rewording to indicate that soils upland of the riparian corridor is the topic of this sentence would help. Clearly riparian soils are a current intimate component of the river ecosystem.

**Response:** Accepted.

34. Page 5.1, 2nd last paragraph

The document states that "Most recently, cleanup efforts have been initiated on the island closest to and downstream of the 100-D Area". The word "initiated" suggests that DOE plans to complete a survey and removal of particles on the rest of the island. That is not DOE's intent as portrayed to us. A slight rewording would help.

**Response:** Accepted. DOE will subject the existing data to the EPA Data Quality Objective (DQO) process and will abide by the decisions attained through the DQO process.

35. Page 5.1, Section 5.0

This section needs to conclude by telling the reader if discrete particles of cobalt will be included in the assessment or not. As it stands it is unclear if this page is the extent to which particles will be addressed, or if they will be specifically addressed in the subsequent risk assessment. Earlier tables identify <sup>60</sup>Co as a contaminant of concern, but it is not indicated if this refers to the contaminant in disperse form or as discrete particles.

**Response:** Accepted.

36. Page 6.1, Section 6.0

As for section 5.0, this section discusses an issue but does not indicate if that is the end of this discussion for the project, or if this will be included in the subsequent risk assessment. As for discrete particles, we would expect shine (Compton scatter) to be included in the full risk assessment.

**Response:** Accepted.

37. Page 7.3 - 7.4, Section 7.2

Only the last paragraph of this section appears to have relevance to the Columbia River assessment. Perhaps a more pointed introduction to section 7.2 that explains how the listed programs identified contaminants of concern to this document/CRCIA. Or perhaps drop this section: The section 7.2 did not appear to have any net affect on the

contaminants in table 9.1, and the last paragraph could slip onto the end of section 7.1.

**Response:** Accepted in part. A more pointed introduction will be developed.

38. Page 8.1, 2nd sentence  
The document states that "Some of the first questions raised during the public review...". It is unclear what 'first' refers to. We compiled the public comments and provided them to DOE sorted by contributor, not by which comments were received first. We would suggest removing the word "first".

**Response:** Accepted.

39. Page 8.1, middle of 1st paragraph  
The document states that "Questions were asked about the inclusion of..." and then 14 contaminants were listed. Is the intent of the next paragraph to state that, of these 14 contaminants, x are included as contaminants of concern, and 14-x are not included due to background or short half-lives? As a reader, I lost the essence of the paragraph in the detail. The topic sentence "The majority of these topics have been addressed in this report" invites the reader to catch which topics were ignored and ponder why.

**Response:** Accepted.

40. Page 8.1, Section 8.0, 2nd paragraph, last line  
Global fallout is discussed and appears to be pivotal in the decision for some contaminants, yet again no reference is provided. Provide the references and include the values in appendix B.

**Response:** Accepted in part. A reference will be provided.